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Open Access Review Article

HERBS AS TRADITIONAL MEDICINES: A REVIEW

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ABSTRACT

Ayurveda is believed to have originated over 6000 years ago It was designed to promote good health and long life rather than to fight disease and was practiced by physicians and surgeons (called Bheshaja or vaidya) but recently herbal medicine have attracted much attention as alternative medicines useful for treating or preventing life-style related disorders. Herbs are the nature's gift to human being to make disease free well life. The diverse tradition of India is a prosperous source of traditional medicines, many of which are of plant origin. Herbal medicines refers to the use of any plant's seeds, berries, roots, leaves, bark or flowers for medicinal purpose. There are different sources of drug. Broadly speaking, there are two sources of drug namely synthetic and natural. Many drugs used in medicine today are developed by chemical synthesis. A recognized number of drugs are obtained from natural sources. The most important natural sources of drugs are (1) higher plants, (2) microbes, (3) animals and (4) marine organisms.

Keywords: Ayurveda, Traditional medicines, higher plants, microbes, marine organisms

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INTRODUCTION

Ayurveda, which means science of long life, is believed to have originated over 6000 years ago and was designed to promote good health and long life rather than to fight disease and was practiced by physicians and surgeons (called Bheshaja or vaidya) but recently herbal medicine have attracted much attention as alternative medicines useful for treating or preventing life-style related disorders (Agyare *et al.*, 2009).[1]

Ayurveda is consisting of two words- Ayur and Veda. Ayur means life and Veda means knowledge or science. Thus Ayurveda explains us the methods of remain healthy and to treat diseases. Ayurveda pharmacopoeia is comprise of more than 1200 species of plants including cinnamon and cardamom etc, nearly 100 minerals including sulpher, arsenic, lead and copper sulphate and over 100 animal products including milk, bones and gall stones (Crag and Newman 2001).[2]

A number of recent drugs have been isolated from plants for thousands of years. Human being was totally reliant on plant based medicines for their primary health care before the discovery of synthetic drugs (Singh *et al.*,2008).[3] Herbs are the nature's gift to human being to make disease free well life.

The diverse tradition of India is a prosperous source of traditional medicines, many of which are of plant origin. There are about 45,000 plant species which possess medicinal properties (Grover *et al.*, 2002).[4] In ancient cultures peoples collected information about herbal drugs and documented in herbal pharmacopoeias (Soumya *et al.*, 2009).[5]

Modern pharmacopoeias recorded more than 25% drugs derived from plants some of which are of synthetic analogues (Astin 1998).[6]

India is perhaps the largest producer of herbal drugs and is also called as botanical garden of world. Nearly 6000 plants in India are used in traditional, folk and herbal medicine (Dubey *et al.*, 2004; Rajshekhran 2002).[7,8] Initially crude drugs such as powders, tinctures, teas, poultices and other herbal formulations were used for curing diseases. Isolation and separation of active

compounds from plants began in early 19th century (Kinghorn 2001).[9]

Ayurveda, Unani and Sidha are the most established herbal therapeutic system of India. Ayurveda utilizes near about 1000 single drugs and over 8000 compound formulations of recognized merit. About 600-750 herbs and plants are utilized by Unani, Sidha and Amchi system. At present India is exporting herbal drugs and other related material of costing about Rs. 6.5 billion**.**

Herbal medicine is also called as botanical medicine or phytomedicine. Herbal medicines refers to the use of any plant's seeds, berries, roots, leaves, bark or flowers for medicinal purpose. Herbalism is becoming main stream and research show value of herbs in the treatment and prevention of disease. Scientific data on such plant derivatives could be of clinical use (Gupta 1994).[10]

There is still a great interest in medicinal herbs all over world. The main reason for this is that herbs contain compounds of therapeutic efficacy and they are more natural and more acceptable to patients than synthetic drugs (Szabadi 2006; Ang-Lee *et al.*, 2002).[11, 12]

In the early 19th century, when methods of chemical analysis first became available, scientists began extracting and modifying the active ingredients from plants. Later, chemists began making their own version of plant compounds, beginning the transition from raw herbs to synthetic pharmaceuticals. Over time, the use of herbal medicines declined in favor of pharmaceuticals.

Practitioners from herbal medicine usually use unpurified plant extract. This unpurified plant extracts contain several different constituents. They claim that these can work together synergistically so that the effect of whole constituents is greater than the total effect of its individual constituents. Toxicity is also reduced when whole herbs are used instead of isolated ingredients (Andrew *et al.*, 1999).[13]

Historical and current studies and surveys signify that the Eastern region of the Mediterranean has been well-known throughout the generations with a rich inventory of natural medicinal herbs. Arab medicine has contributed greatly to the development of modern medicine in Europe and remains one of the closest forms of original European medicine. The rapid increase in consumption of herbal remedies worldwide has been stimulated by several factors, including the notion that all herbal products are safe and effective (Bashar *et al.*, 2005).[14]

The use of traditional medicine is increasing day by day in every country. The goal of "health for all" cannot be achieved without traditional medicine and has maintained a traditional medicine program since 1978 (Rojas *et al.*, 2003).[15]

In United state, products such as Ginkgo, Echinacea, Garlic and many others are advertised widely as safer, more natural and healthier alternatives to conventional medicines. Annual retail sales as of mid 1998 approached $4 billion, and, according to recent surveys, 12% to 37% of US consumers have used herbal medicines (Eisenberg *et al.*, 1998; Brevoort 1998) [16, 17].

According to recent surveys and studies, 15% to 40% consumers have used herbal medicine to cure many diseases. In last 25 years in United States, due to increasing cost of prescription medicines, combined with an interest in reusing to natural or organic remedies, has led to an increase in use of herbal medicines. Approximately 70% of German physicians prescribe plant based medicines to the patients.

NATURAL SOURCES OF DRUGS

There are different sources of drug. Broadly speaking, there are two sources of drug namely synthetic and natural. Many drugs used in medicine today are developed by chemical synthesis. A recognized number of drugs are obtained from natural sources.

The most important natural sources of drugs are (1) higher plants, (2) microbes, (3) animals and (4) marine organisms.

1. Higher Plants

There are 200,000 to 250,000 species of flowering plants growing on earth which belong to 10,500 genera are source of about 300 families. Of these higher plants, a number of genera are source of drugs. These genera are distributed among plant families like *Solanceae, Compositae, Papveraceae, Scrophulariaceae, Leguminosae, Rutaceae, Rubiaceae, Umbelliferae, Dioscriaceae, Gentaceae, Bromeliaceae, Apocynaceae, Rhamnaceae, Caricaceae, Plantaginaceae, Sterculiaceae, Ericaceae, Liliaceae* and *Gramineae*. Scrutiny of the drugs obtained from plants reveals that the majority of the drugs are derived from seed bearing plants (spermatophytes). Among the spermatophytes the angiosperms (flowering plants) have yielded a good number of useful medicinal plants than the gymnosperms (non flowering plants). The gymnosperms are useful sources for oils, resins and the alkaloid ephedrine. Within the angiosperms both monocotyledons and dicotyledons provide many useful drugs. Among the dicotyledons cinchona, ipecac, rauwolfia, belladonna, vinca are some of the important drugs from higher plants.

Drugs consisting of entire plant or some part of it are often designated as crude drugs. Generally only that part of the plant which contains the greatest amount of active constituent is collected and marketed. Thus a crude drug may consist of seeds, fruits, leaves, flowers, roots, and barks of stem or roots. In some cases the wood of a tree may be used as a crude drug. Many of the plant products are important therapeutically. These are represented by the alkaloid, cardiac glycosides, anthraquinones, flavonoids, mucilages and enzymes. Plant product like steroid sapogenins are important raw material for the synthesis of steroidal hormones and related drugs. Besides higher plants some of the lower plants also provide a number of useful drugs. Ergot which is a fungal drug is source for ergotamine. Many fungi are source of antibiotics. Agar and alginic acid are obtained from algae.

2. Microbes

The microbes are microscopic organisms which include

viruses, bacteria and rickettsiae. These microorganisms are source of many immunizing biological drugs. These immunizing biological drugs are intended to confer either active immunity or passive immunity against various infectious diseases. Active immunity means the specific immunity developed by an individual in response to the introduction of antigenic substance into the body. It can be artificially acquired through administration of a vaccine or toxoid. Passive immunity is the type developed by the administration of preformed antibodies into the body. It can be acquired by introduction of antitoxins.

Vaccines

Vaccines are suspensions of living, dead, or attenuated (less virulent) microbes. Depending upon the source the vaccines are classified into three groups i.e. viral vaccines, bacterial vaccines prepared from viruses, bacteria and rickettsiae, respectively.

Viral Vaccines: Viral vaccines are used as prophylactic agents against smallpox, rabies, influenza, polio, measles and mumps. They contain live, attenuated or killed virus.

Followings are different types of viral vaccines.

- Smallpox vaccine
- Rabies vaccine
- Influenza virus vaccine
- Poliomyelitis vaccine
- Measles vaccine
- Mumps vaccine
- Rickettsial vaccines

Bacterial vaccines: bacterial vaccines consist of suspensions of killed or attenuated pathogenic bacteria in isotonic sodium chloride solution or other suitable diluents. The general method of preparing a bacterial vaccine is cultivation of the specific organism in a suitable broth medium. The organisms remaining on the filter pad are washed with saline to remove any residual culture medium. They are then suspended in saline and killed, usually by addition of formalin, phenol, heat, or other suitable preservative the product is adjusted to a specific potency. Typhoid vaccine, cholera vaccine, plague vaccine, pertussis vaccine, BCG vaccine are the important bacterial vaccines which are used as active immunizing agents. Followings are different types of bacterial vaccines.

- Typhoid vaccine
- Cholera vaccine
- Plague vaccine
- BCG vaccine

Toxoids: are also microbial products used to produce active immunity against diseases. The waste products of bacteria which are poisonous to the animal body are called toxins. When the excreted toxins of the bacteria are dissolved in the surrounding culture medium they are known as exotoxins. When they are retained within the bacterial body they are referred as endotoxins when the exotoxins are treated formaldehydes their toxic properties are reduced or eliminated but their antigenic property is retained. These products are called fluid toxoids. When the fluid toxoid is precipitated with or absorbed on alum, aluminum hydroxide or aluminum phosphate an adsorbed toxoid is produced. Both fluid and adsorbed toxoids are used to induce artificial active immunity in susceptible individual. Tetanus toxoid and diphtheria toxoid are the examples of such microbial products. A combination of diphtheria and tetanus toxoid with pertussis vaccine is known as triple antigen or DPT. it is used to produce immunity in young children against diphtheria, tetanus and whooping cough.

3. Animals

Certain animal parts and animal products are used as drugs. The major groups of animal products are used in medicine are hormones, enzymes, animal extractives, organs and bile acids.

Hormones

Hormones are mammalian products that are secreted by endocrine or ductless glands of animals, and released directly into the blood. The most important hormone products are thyroid, conjugated estrogens, insulin, epinephrine (adrenaline), oxytocin, vasopressin and gonadotropins.

Thyroid is a modified preparation of the thyroid glands of sheep and pigs. It is given orally to treat patients suffering from thyroid insufficiency. It contains the hormone thyroxin.

Conjugated estrogen is an amorphous preparation containing water soluble conjugated forms of mixed estrogens obtained from thyroid urine of pregnant mares. It is employed in the treatment of menopausal symptoms in the female and also used for therapy of dysmenorrhea.

Insulin is a polypeptide hormone secreted by the beta cells of the islets of langerhans, situated in the pancreas of all vertebrates. Pancreas of cattles or pigs is the major source of this hormone. Insulin is available in several different forms. It is used in the therapy of diabetes.

Epinephrine (adrenaline) is a hormone produced by adrenal medulla in man. It is found in other animal also. Because of its simple structure, all of the epinephrine used in medicine today is prepared by synthetic means. It is used as a vasoconstrictor drug. It is also a rapid acting bronchodilator useful in the treatment of acute asthma.

Oxytocin is a polypeptide hormone secreted by posterior pituitary gland. It causes contraction of uterine muscles and also stimulates the ejection of milk in lactating mothers. This hormone is obtained from the pituitary glands of cattles and pigs. It can also be prepared by synthesis. Oxytocin is used to induce labor in full-term pregnant women and to stop hemorrhage after child birth.

Vasopressin is also a peptide hormone obtained from the posterior lobe of pituitary gland of healthy cattle and pigs. It is used in the treatment of intestinal paralysis. It is also used in the treatment of diabetes insipidus because of its antidiuretic action.

Gonadotropins are mucoid hormones secreted by the

anterior lobe of the pituitary gland. These hormones are prepared commercially from either horse serum or from the urine of pregnant women. They control the production of sex hormones in the body. Medicinally they are used in the treatment of infertility.

Enzymes

Enzymes are biological catalysts produced by living organisms. The enzymes are proteins whose molecular weight ranges from about 13,000 to 840,000. Some of the important enzymes used in medicine are pancreatin, trypsin, chymotrypsin, fibrinolysin, pepsin and hyaluronidase.

Pancreatin is a preparation which contains enzymes of the pancreas. It is prepared commercially from pig pancreas. It is used in the treatment of pancreatitis, a condition resulting from a deficient production of these enzymes by the body.

Trypsin is a proteolytic enzyme prepared commercially from the pancreas of ox. It is used by topical application for treatment of wounds, ulcers, abscesses, and fistulas. It is also used as an anti- inflammatory agent.

Chymotrypsin is also a proteolytic enzymes produced by the pancreas in the form of inactive chymotrypsinogen. The enzymes are obtained commercially from the pancreas of ox. It is used for the same purposes as trypsin.

Fibrinolysin is prepared from profibrinogen which is isolated from human plasma. It is activated to fibrinolysin by the streptokinase. It is employed in the treatment of venous thrombosis and pulmonary embolism, but its use is of questionable value.

Pepsin is the proteolytic enzyme of the gastric juice. It is produced commercially from glandular layer of fresh pig stomach. Pepsin is useful in the treatment of achylia gastrica, a condition in which the stomach fails to produce both acid and pepsin. This condition is observed most often in patients suffering from pernicious anemia or gastric carcinoma.

Hyaluronidase is representative of a group of enzymes of a group of enzymes which have the common ability to cleave the glycosidic bonds of hyaluronic acid, a mucopolysaccharide. Hyaluronidase is produced by some microorganisms, and is found in the heads of leeches, in snake venom and in mammalian testes. Commercially it is produced from animal source. Its chief use is in facilitating the administration of fluids by hydonermolysis.

Animal extractives and organs

Liver and stomach preparations and bile are the examples of this group. Liver and stomach are derived from healthy and domesticated animals and converted into suitable preparations which are used as replacement therapy in pernicious anemia.

Bile is a natural secretion of the liver which passes into the intestinal tract and aids in the digestion of fats by emulsifying them and promoting their absorption. Bile is stored temporarily in gall bladder. Bile contains sodium salts of bile acids - dehydrocholic acid, tsurocholic acid and deoxycholic acid. Bile acids are used in cases where biliary secretion is deficient. They are also used in cases where biliary secretion is deficient. They are also used parenterally as sodium salts to increase diuresis.

Other useful animal drugs

Besides the products mentioned above, there are several other animal drugs used in pharmacy. These include carmine, a coloring principle obtained from cochineal insects; cod liver oil; cantharidin, an irritant constituent of cantharides insects; and heparin. Wool fat and lanolin are used in certain formulations and in cosmetic industry.

4. **Marine Organisms**

The 139 million square miles of sea water that covers 71 per cent of our earth has been a treasure chest in the past, giving us important elements, food, raw materials and some useful drugs. We are now at the threshold of a new era when the sea is going to be exploited as never before for its untold hidden wealth. It should indeed provide mankind with a number of new and interesting drugs. Currently useful pharmaceuticals and drugs from the ocean may be enumerated as below.

Classical pharmaceuticals

Sea weeds yield various hydrocolloids (generally complex polysaccharides) which are of immense commercial value as they are used extensively in the food and drug industries as thickening, emulsifying and suspending agents. In the Maritimes, carrageenan from chondrus crispus (Irish moss) and alginates from species of laminaria are prime examples. Alginic acid, as such or in the form of salts, has many uses in the pharmaceutical field as well as others.

These substances are utilized in adhesive formulations and as stabilizers, ingredients of ointment bases, suspending agents and tablet disintegrating agents and in the preparation of sustained release modifications and absorbable haemostatic materials. The substances are derived chiefly from various species of brown sea weeds. Sodium alginate has the unique property of inhibiting radio strontium from being absorbed from the gastrointestinal tract without seriously affecting the absorption of calcium, sodium or potassium. Agar is another widely used colloid obtained from species of gelidium and gracilaria. The brown algae constitute a major commercial source of the hexahydric sugar alcohol mannitol which is a useful diagnostic agent in kidney function tests, a sucrose substitute in diabetic foods, an excipient in chewable and multilayer tablets and, when nitrated. It forms mannitol hexanitrate, a coronary vasodilating agent.

Spermaceti

Spermaceti is a waxy solid obtained from the head of the sperm whale and consists almost exclusively of cetyl palmitate. It has emollient properties and is a pharmaceutical necessity for cold creams and many ointment bases.

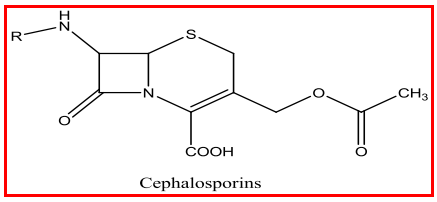
Ichthammol and diatomaceous earth

Ichthammol, a black tarry distillate from bituminous

schists containing fossil fish, is well known as a topical agent with mild antiseptic and stimulant properties. Diatomaceous earth (siliceous earth, kieselguhr) is composed of the fossilized unicellular algae. Depending on the particle size, diatomaceous earth is used in face powders, filtering aids, dentifrices and adsorbent in chromatography.

Contemporary Pharmaceuticals

Antimicrobial activity is shown by a wide variety of marine products. To date, however, only the marine fungus cephalosporium acremonium has made an impact on clinical medicine. This fungus produces the antibiotic cephalosporin C, which is fundamental nucleus for the semisynthetic preparation of the cephalosporin group of antibiotics.



Cephalosporins

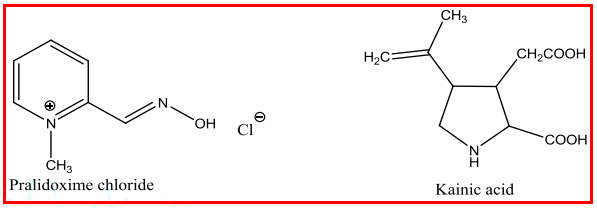
This group of bactericidal agent is closely related, chemically and pharmacologically, to the pencillins. At present about eleven cephalosporins are in use in various countries of the world.

The prostaglandins, a ubiquitous group of hormones derived from the essential fatty acids, exhibit a wide variety of pharmacological activities. Intravaginal administration or intravenous injections of prostaglandins E2 and F2 have been used to induce abortion or to induce labor at term. The caribean coral plexaura homomalla is a rich source of epi-PGA2 which can be converted in the laboratory to yield PGE2 and PGF2. The latter is now marketed as an oxytocic agent.

Currently useful drugs from sea

Protamine is a strongly basic, low molecular weight protein, obtained from the sperm and testes of certain fish, e.g., the salmon. Protamine combines readily with the strongly acidic heparin to form a stable salt, with a concomitant loss of heparin activity. Therefore, it has been found useful in medicine as a complexing agent with insulin to render the insulin relatively insoluble in body fluids. Thus, when administered subcutaneously in aqueous suspension the insulin-complex dissolves slowly, and the insulin is absorbed at a slow and steady rate.

Pralidoxime is a valuable antidote for certain types of insecticide poisoning in humans. Although available in the U.S.A., it is used most widely in Japan, where the insecticide parathion is applied extensively to rice crop and people frequently are poisoned by ingestion of rice crop and people frequently are poisoned by ingestion of rice contaminated with the insecticide.



Kainic acid Japanese folk medicine described an ascaricide prepared from the dried red algae digenea simplex. This contains an unusual amino acid known as kainic acid, which is now commercially available for use as an anthelmintic.

Cod-liver oil is a fixed oil obtained from the fresh livers of the codfish which contains the growth-promoting and antixerophthalmic vitamin A (about 850 units/g), the antirachitic vitamin D (about 85 units/g), and the glyceryl esters of mixed unsaturated fatty acids. Other fish-liver oils used for their vitamin A and D content are halibut-liver oil (60,000 units/g of vitamin A and 500 units/g of vitamin D), shark-liver oil (16,500 units/g of vitamin A and 40 units/g of vitamin D) [18].

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